Meanderings in Data

- Single & Di-EM Skims
  - Does it matter which one you use?
- Athena - root-tuple maker
  - Status, features and improvements
- Post-shutdown Data
  - Preliminary $Z \rightarrow ee$ numbers and distributions
  - Differences in high luminosity data (>45E30)

Z (+Dijet) Candidate Selection

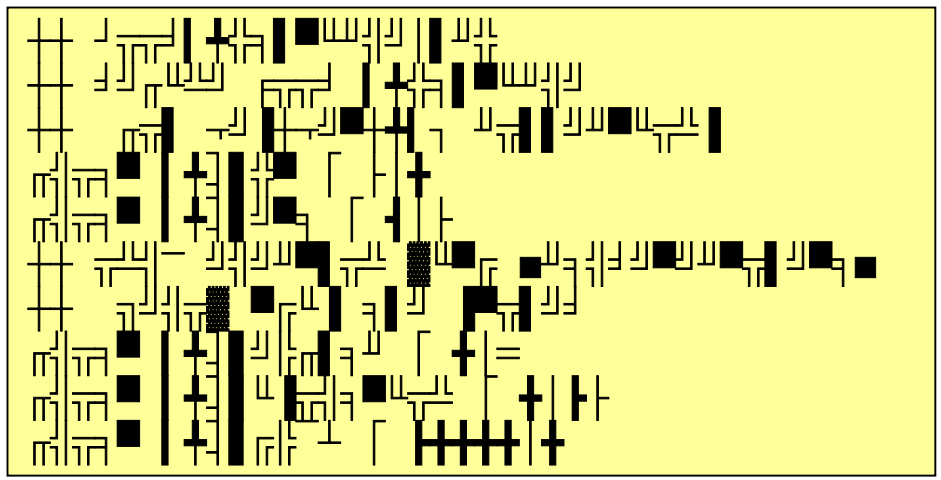
- 2 Good Electrons
  - EM Fraction>0.9
  - Isolation < 0.15
  - HMx7 <20.0
  - pT > 20 GeV
  - |eta_detector| <1.1
  - 1 or more track matches
    - Cut on chi2 of track match based on E/p & distance
- Z mass window cut (80-100 GeV)
- Diem Trigger
  - 2EM_HI or E1_2L20
- Remove bad runs (CAL+CFT+SMT) and bad LBNs (Jet/MET, no t42)

- Good Jets
  - 0.05 < EM Fraction <0.95
  - CH Fraction < 0.4
  - HotFraction < 10.0
  - N90 > 1
  - dR (Jet- good EM) > 0.45
    - Need to be careful
  - Corrected Jet pT >20 GeV
  - L1 confirmation
    - Done for us with d0correct

Single & Di-EM Skim Comparisons

- Athena v01-04-00 was used to produce 1EMloose root-tuples
- Athena v01-04-02 was used to produce the EM1TRK and 2EM
- To determine luminosity, the same bad run (CAL+CFT+SMT) & bad LBN (Jet/MET, no t42) lists were applied, using the diem triggers
  - 2EM_HI (Runs 151816-178721)
  - E1_2L20 (Runs 178722-180956)
    - Inclusive run ranges
- Duplicate events removed
- Forgot to remove the bad Lumi LBNs for this study…

- In Athena v01-04-02, we get jets from the corrected jet chunk with d0correct creates
  - In v01-04-00, we use the standard jet chunk
- D0correct removes the jets overlapping with good EM particles with pT>5 GeV
  - Is this a good idea?

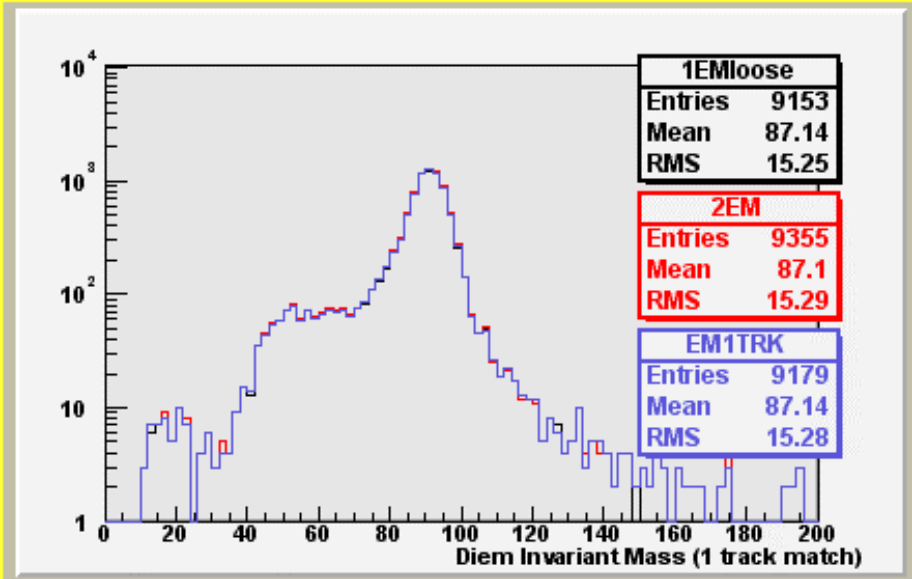


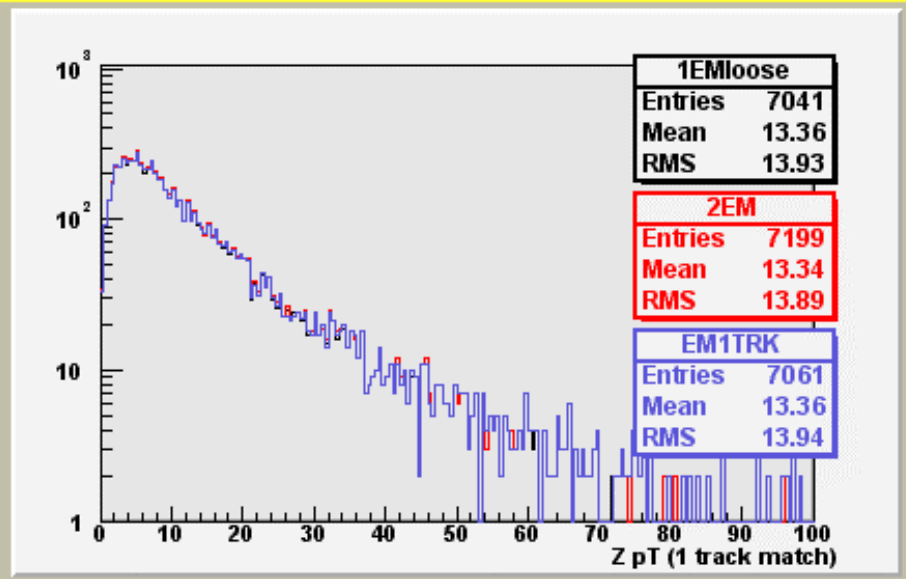
Skim Comparison Numbers

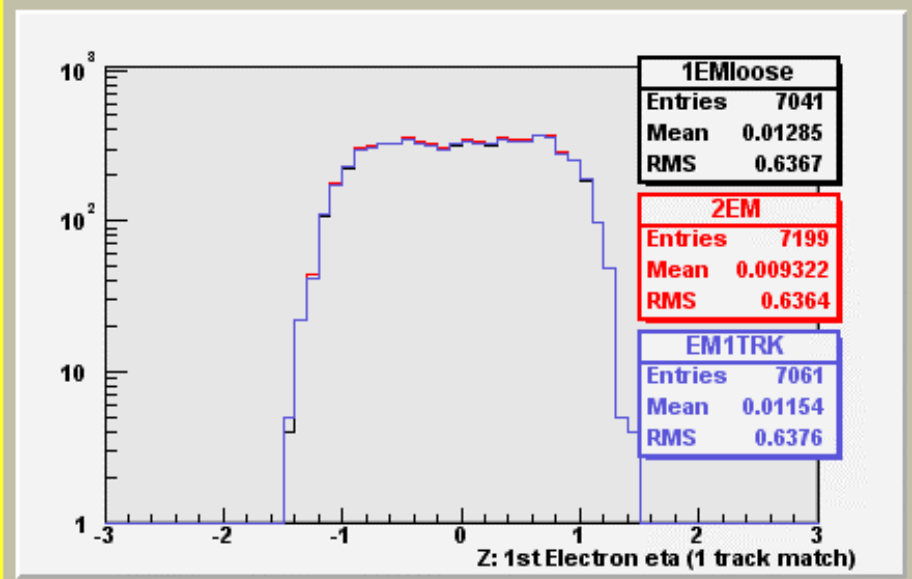
Skim	Total Events	# Diem Events (CC only)	# Z Candidates (1 or more track matches)	# Z+dijet Candidates	Luminosity (pb-1) Using diem trigger
1EMloose	73,577,599	28,127	7,041	194	168.41
EM1TRK	32,137,764	18,504	7,061	184	170.01
2EM	9,720,359	28,725	7,199	184	173.03

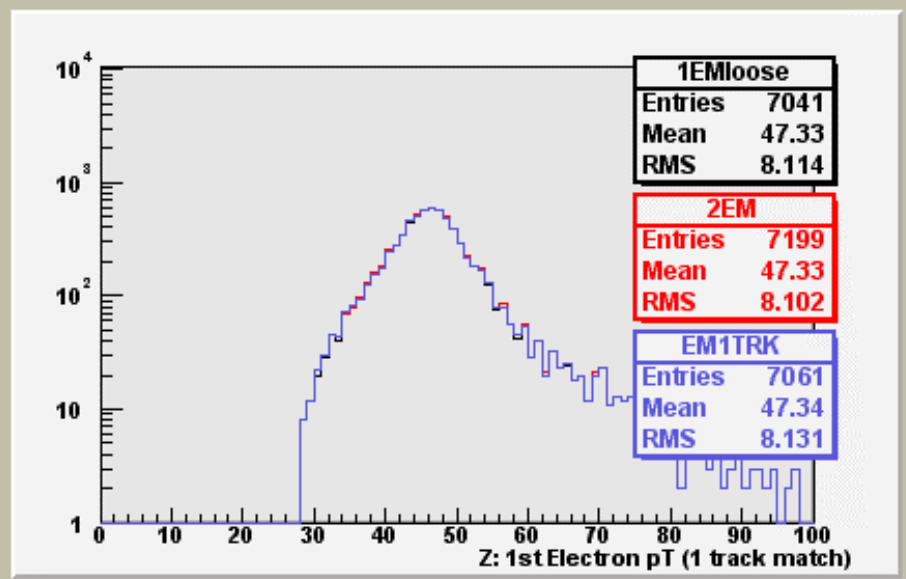
- Diem and Z candidate numbers are in good agreement
  - Differences could be attributed to slightly different luminosities
- Slightly fewer Z+dijet candidates in sample processed with v01-04-02
  - We think d0correct is throwing away too many jets
    - I'll come back to this…

Diem & Z Candidate Distributions

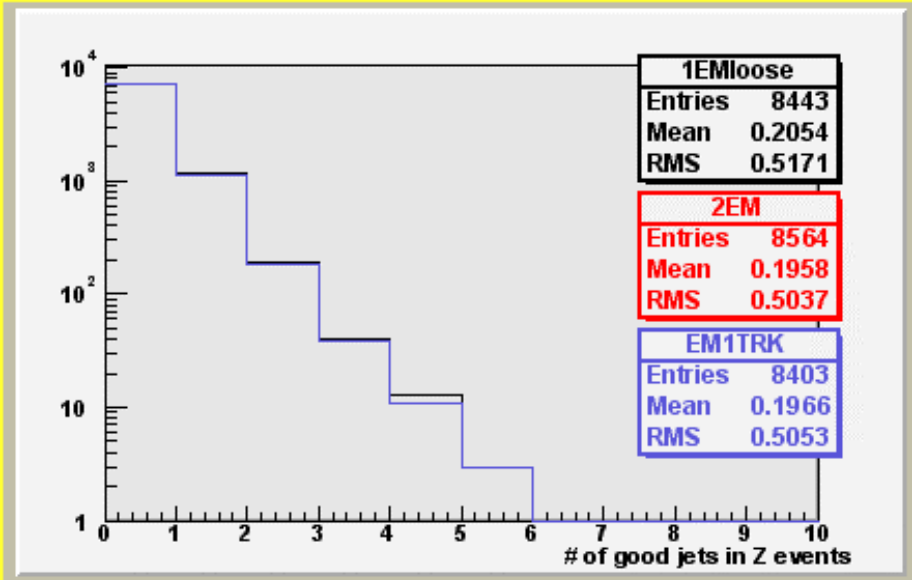


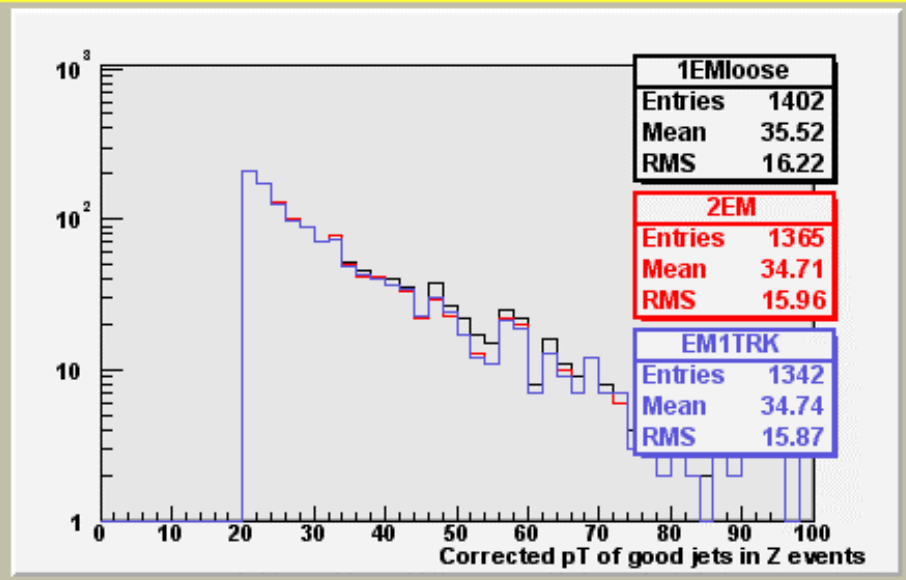


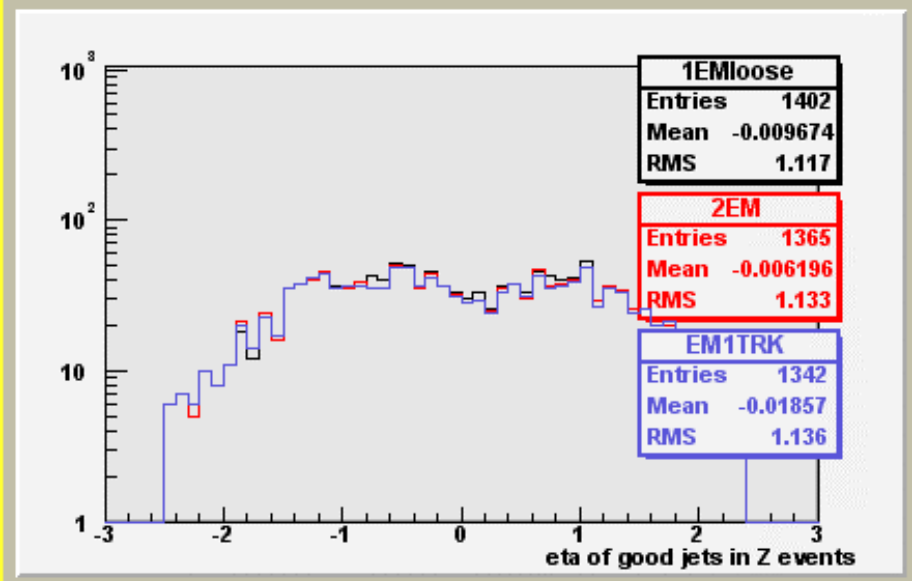


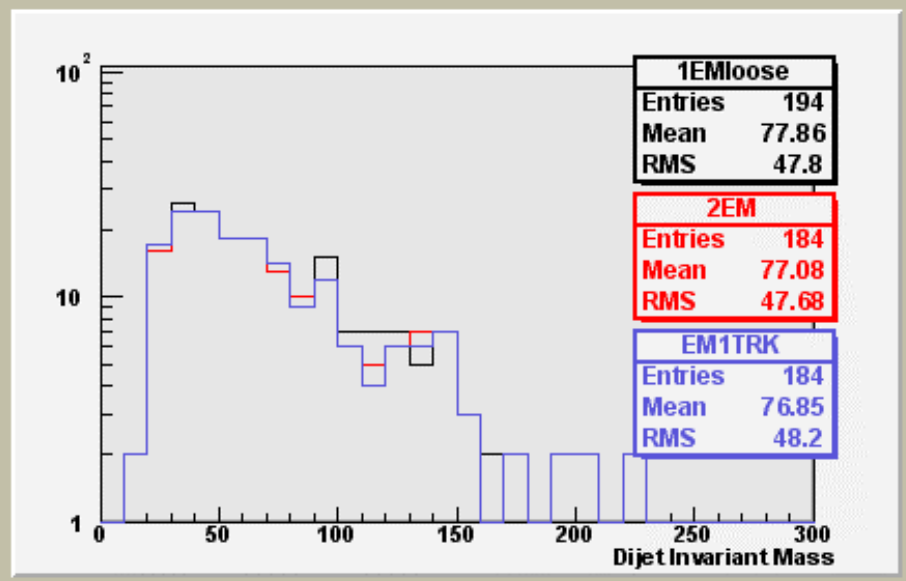


Z+dijet Candidate Distributions









What about Trigger?

Skim	Z Candidates (1 or more track match - before trigger cut)	Single EM Trigger		Di-EM Trigger	
1EMloose	7315 V11: 5452 V12: 1863	em_mx	5443 (99.83%)	2EM_HI	5181 (95.03%)
		e1_sht20	1857 (99.68%)	E1_2L20	1860 (99.84%)
EM1TRK	7334 V11: 5471 V12: 1863	em_mx	5462 (99.84%)	2EM_HI	5201 (95.07%)
		e1_sht20	1857 (99.68%)	E1_2L20	1860 (99.84%)
2EM	7475 V11: 5612 V12: 1863	em_mx	5603 (99.84%)	2EM_HI	5339 (95.14%)
		e1_sht20	1857 (99.68%)	E1_2L20	1860 (99.84%)

- Will look at OR of single and diem triggers…

Athena root-tuple maker

- Developed by Suyong and Jodi

www-d0/~suyong/athenaweb/athena.htm

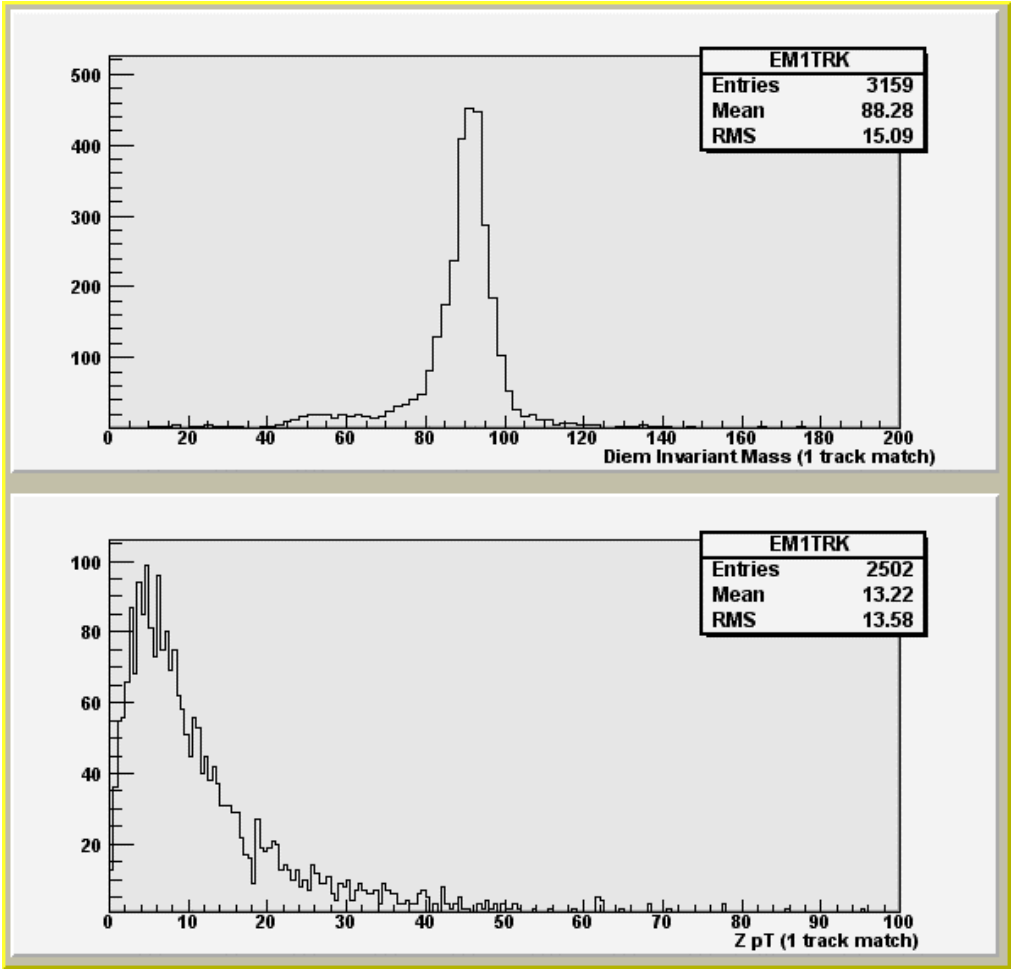
- Latest version v01-04-02
  - JES & MU corrected jets
  - D0correct v00-00-06
  - Loose, medium and tight SV taggers
  - L1/L2 trigger block
- Discovered some discrepancies with results from v01-04-00 & v01-04-02 (now understand)
  - Were really using hmx7 variable in earlier version
  - Jet multiplicity decreases because d0correct provides a corrected jet chunk
  - L1 confirmation cut is already performed by d0correct
- Event size ~10.5 kB
  - Even larger for high luminosities
- Next version (not tagged yet)
  - d0correct/rcp/GoodEMParticle.rcp
    - Raised pT threshold to 10000 GeV
    - Now the user can decide what criteria to reject a jet that is really an electron
- In sample of 92474 events, using 997 MB of disk space
  - 600 MB (60%) - Track branch
  - 313 MB (31%) - L1 branch
    - Need for trigger eff.
- Reduced avg event size by 25%
  - No longer store tracks with pT<500 MeV
    - Don't expect to impact b-tagging
  - Changed doubles to floats
- Coming soon
  - L3 Trigger branch
  - CPS branch (Joshua Dyer)

Post-Shutdown Data

- Use EM1TRK
  - csskim-p14.06.00-postnov2003
  - string Cut1 = ("EM" "(absID==10 || absID==11) && Pt > 8.0")
  - float Cut1Track = (0.1 5.0)
- Data Sample
  - This is a moving target
  - "Froze" my dataset Tue 22:00 with 392 files in SAM & 7,588,724 events
    - As of 7:40 Thu, there are an additional 16 files and 293 k events
  - Run range: 185746-189579
    - 2003 Nov 25 - 2004 Feb 22
  - For simplicity, used E1_2L20 trigger
  - 44 Bad Runs from CAL+CFT+SMT
    - But 9 are before/after dataset run range
  - Did not remove bad LBNs from CALGO group
    - Not certified
- Luminosity summary (pb-1) for trigger E1_2L20
  - Delivered: 64.8751
  - Recorded: 59.3513
  - Recorded: 59.0266 (after bad LBN)
  - Reconstructed: 56.568
    - Compare to 170.01 in pre-shutdown data

What about Z (+dijet) events?

- Used same event selection and Marc's macro
- Events processed: 7667494
  - Passing E1_2L20 trigger : 212202
  - Duplicate events: 480536
    - I think I duplicated one file
  - Events rejected due to bad Lumi LBNs list: 401810
  - Events rejected due to bad CAL+CFT+SMT runs: 34262
  - Events rejected due to bad Lumi, CAL, SMT, CFT: 401810
    - So bad runs are redundant at this time
  - Events with 2 or more good electrons: 5805
  - Events with 0, 1, 2 track matches: 2650, 3159, 1851
  - Events with Z candidates (1 or more trk match): 2502
  - Z+dijet events (1+ trk match): 67



High Luminosity Runs

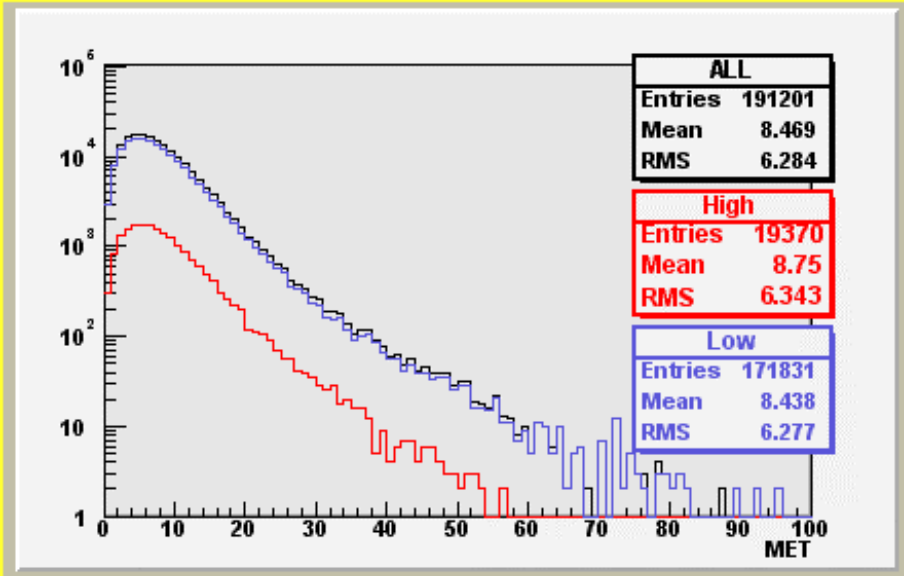
- Most of the stores with the highest initial luminosity - ever at the Tevatron - have occurred since the beginning of 2004
- Can we see any features in events collected in runs with the highest initial luminosity?

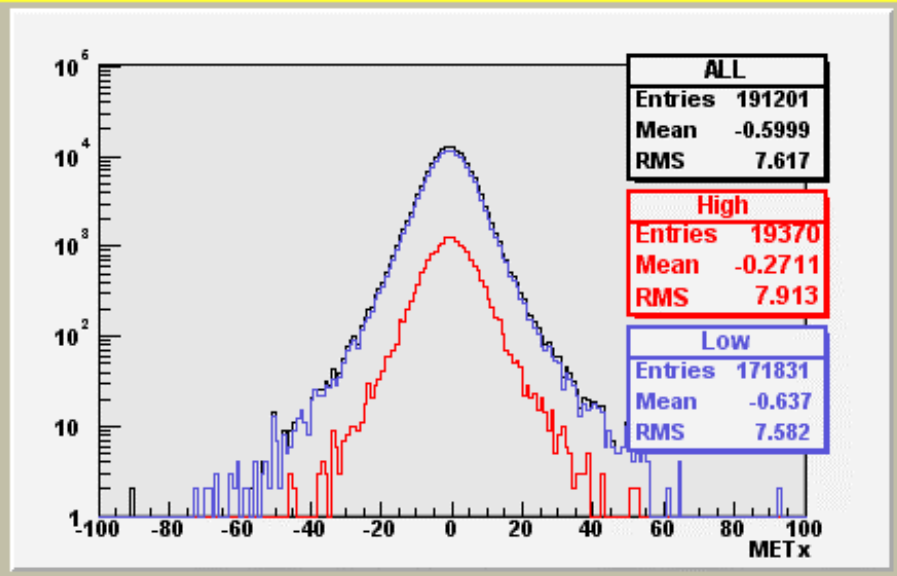
www-clued0/~alstone/p14post/high_lum_40E30.txt

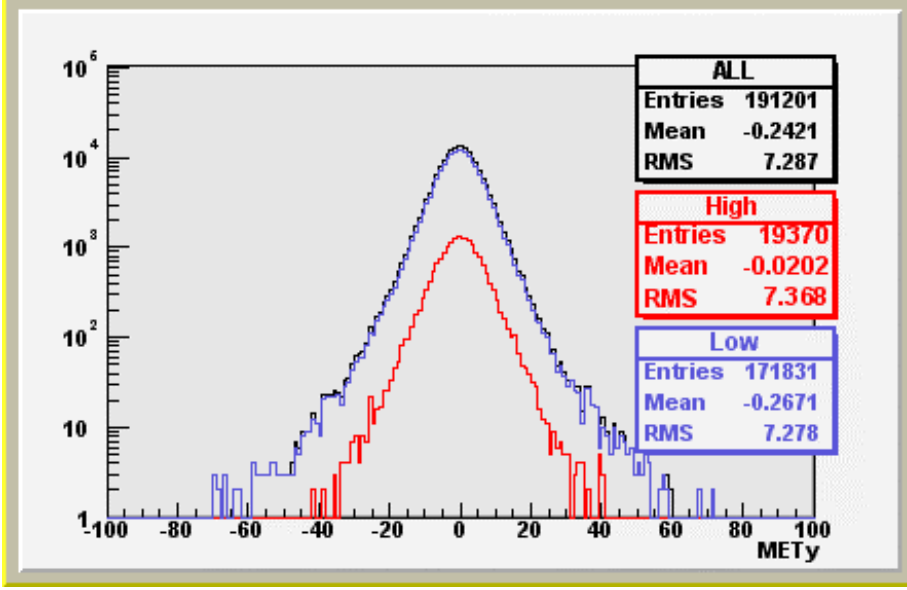
Initial Luminosity (E31/cm^2/s)	Store	Start Time	End Time
6.41	3261	2004 Feb 27 16:42	2004 Feb 29 9:41
6.22	3275	2004 Mar 5 22:57	2004 Mar 7 9:27
5.95	3245	2004 Feb 18 22:06	2004 Feb 20 8:59
5.80	3291	2004 Mar 13 6:37	2004 Mar 14 ?:??
5.76	3283	2004 Mar 9 22:43	2004 Mar 10 15:40
5.65	3256	2004 Feb 25 14:36	2004 Feb 26 12:11
5.60	3219	2004 Feb 5 15:56	2004 Feb 6 20:21
5.58	3277	2004 Mar 7 14:50	2004 Mar 8 21:52
5.49	3237	2004 Feb 15 15:16	2004 Feb 16 22:03
5.43	3222	2004 Feb 7 2:40	2004 Feb 8 18:39
5.40	3252	2004 Feb 22 8:08	2004 Feb 23 14:50
5.39	3240	2004 Feb 17 4:46	2004 Feb 18 8:02
5.27	3217	2004 Feb 4 4:16	2004 Feb 5 8:04
5.25	3214	2004 Feb 2 11:28	2004 Feb 3 21:08
4.99	3108	2003 Dec 20 4:18	2003 Dec 20 6:14

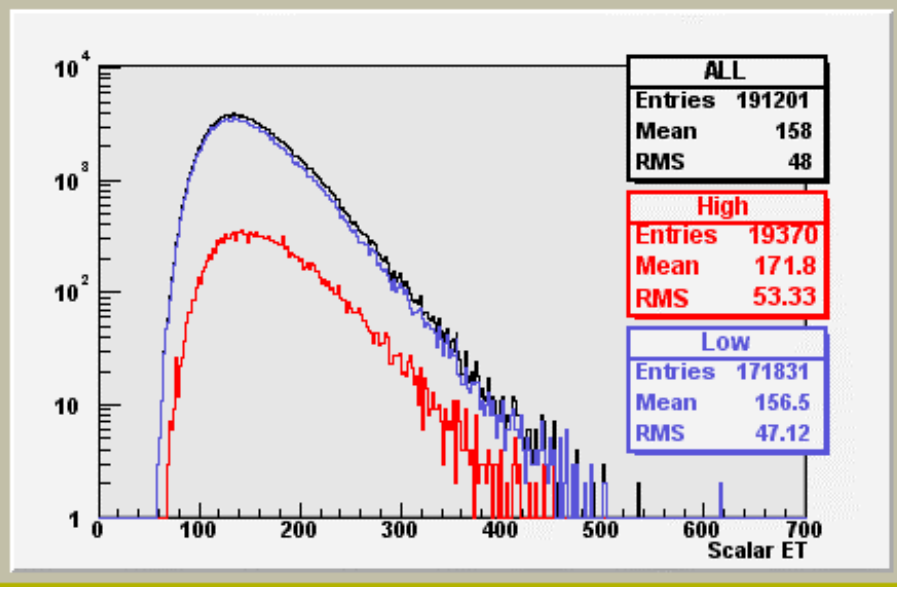
- Following runs in post-shutdown began with an initial luminosity > 45 E30
- 187221 187302 187303 187853 187910 188324 188368 188902 188924 188925 188955 188956 188957 189048 189049 189050 189051 189130 189180 189361 189393 189494 189556 189579 189580 189607 189665 189666 189768 189769 189770 189802 189915 190056 190057 190080 190081 190171 190172 190174 190362 190363
  - Not yet in skim

Missing ET

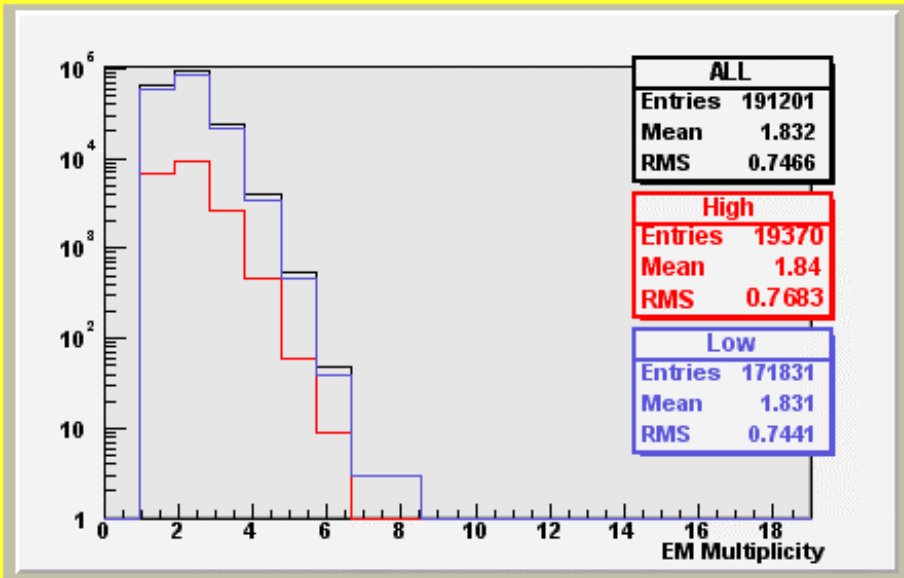

ALL
Entries 191201
Mean 8.469
RMS 6.284
High
Entries 19370
Mean 8.75
RMS 6.343
Low
Entries 171831
Mean 8.438
RMS 6.277
MET

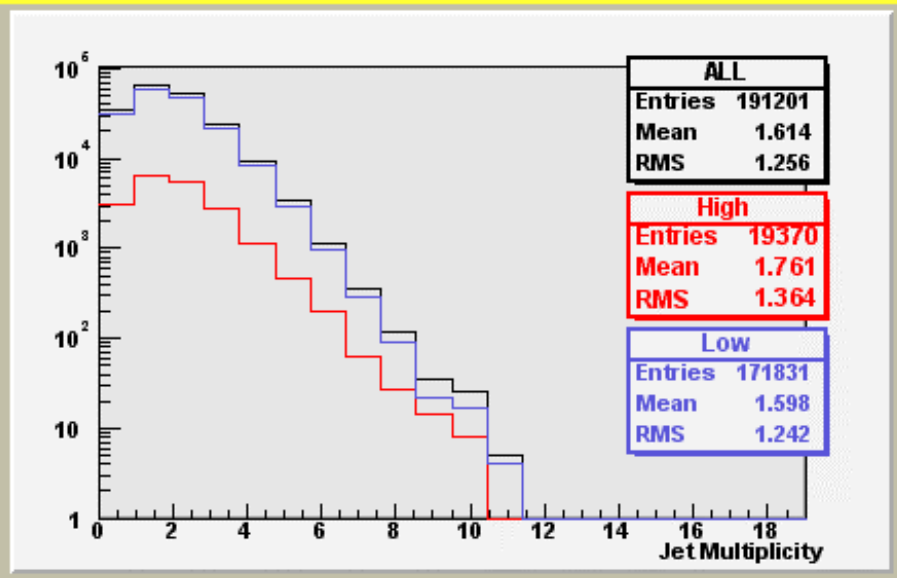

ALL
Entries 191201
Mean -0.5999
RMS 7.617
High
Entries 19370
Mean -0.2711
RMS 7.913
Low
Entries 171831
Mean -0.637
RMS 7.582
METx

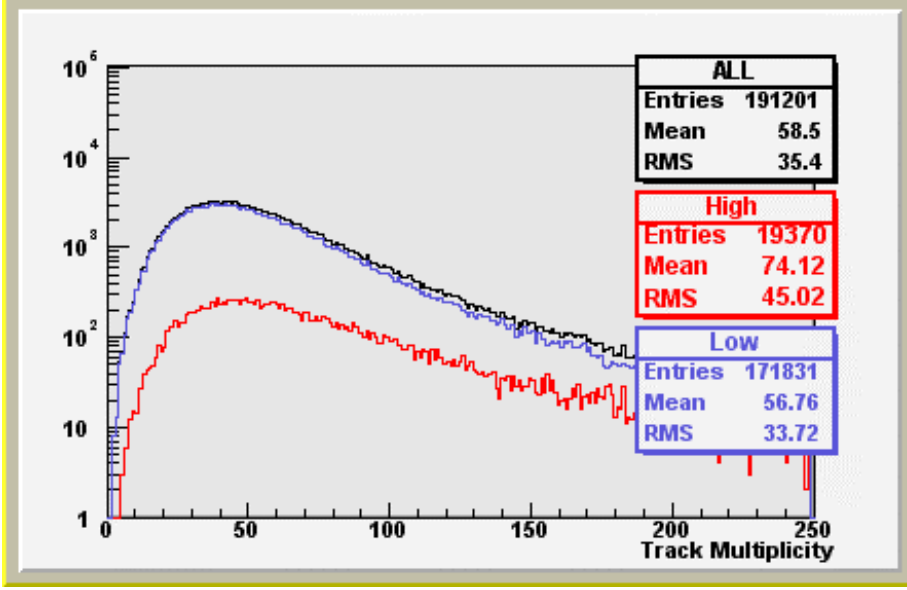

ALL
Entries 191201
Mean -0.2421
RMS 7.287
High
Entries 19370
Mean -0.0202
RMS 7.368
Low
Entries 171831
Mean -0.2671
RMS 7.278
METy

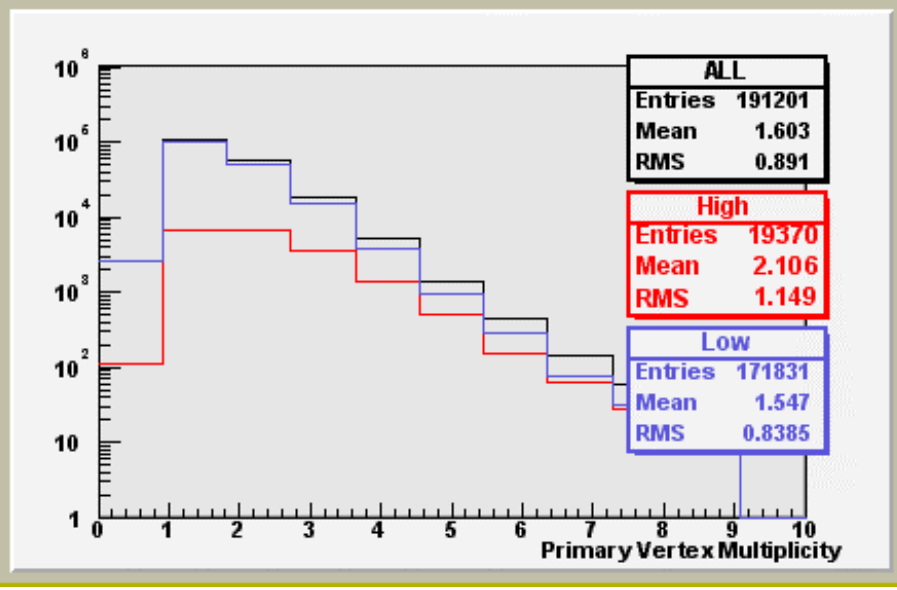

ALL
Entries 191201
Mean 158
RMS 48
High
Entries 19370
Mean 171.8
RMS 53.33
Low
Entries 171831
Mean 156.5
RMS 47.12
Scalar ET

Multiplicities

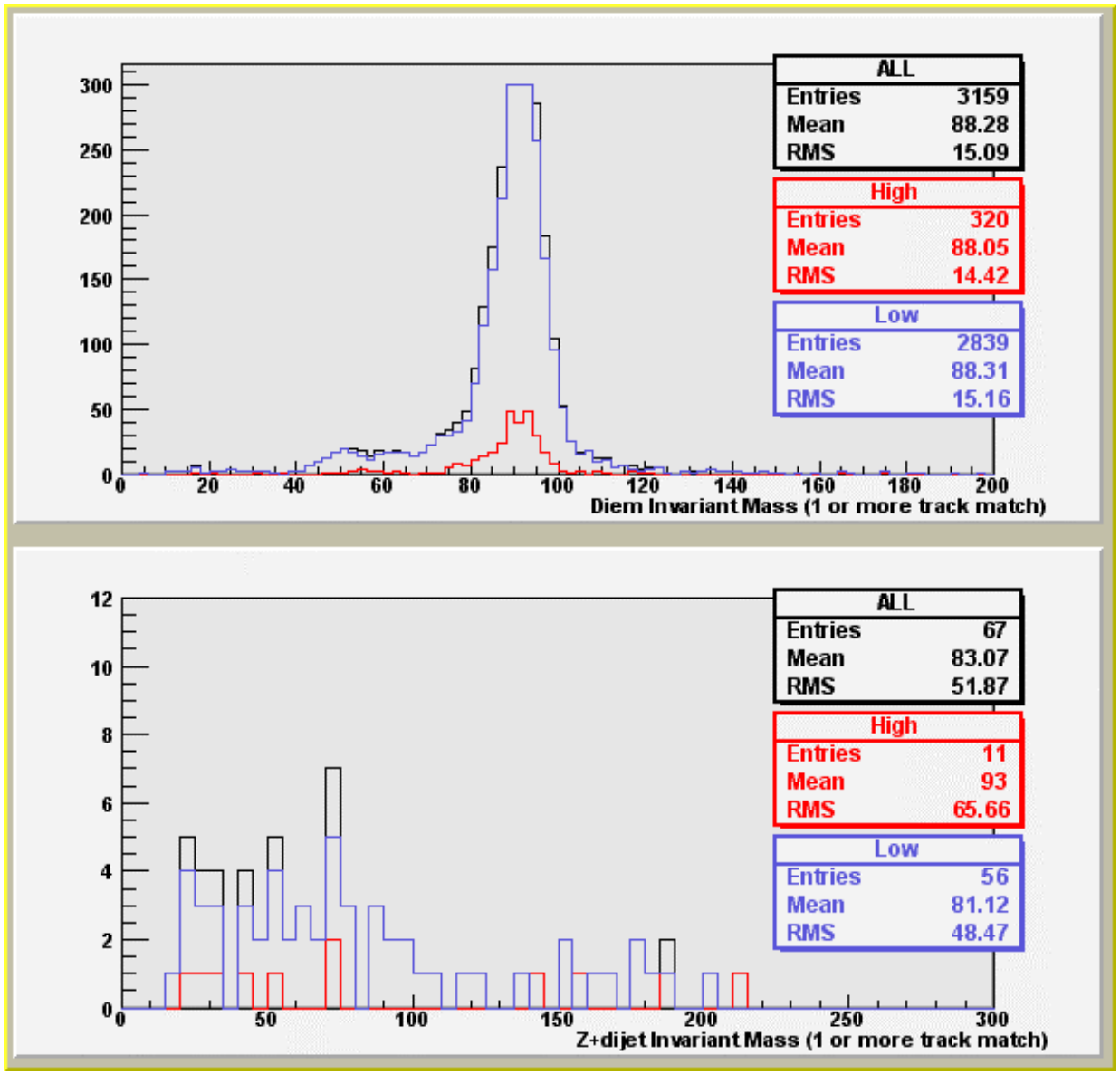








Invariant Masses



Next

- Remake root-tuples with revised Athena
  - Recapture “lost” jets due to d0correct
  - Reduce disk space usage
    - Need room for new data
- Extend eta to EC electrons
- Cross check efficiencies: emid, track, jetid, jetreco,trigger
- Add b-tagging to post-shutdown analysis
- Assist Marc with Z+jets cross section
  - Can combine pre & post-shutdown data?